

WHAT IS CLAIMED IS:

1. A system for performing a storage management procedure, comprising:  
an electronic device configured to receive information from an  
5 information source, said electronic device responsively storing  
said information into a storage medium; and  
a storage manager configured to control said storage management  
procedure by selectively activating a data transcoding procedure  
that transcodes specified segments of said information to thereby  
10 increase available storage space in said storage medium, said  
data transcoding procedure including an immediate mode during  
which said transcoding procedure occurs while said information  
is initially being received by said electronic device, said data  
transcoding procedure further including a mediate mode during  
15 which said transcoding procedure occurs when said information  
is not currently being received by said electronic device.

2. The system of claim 1 wherein said storage medium is implemented to  
include at least one of a non-volatile storage medium, a hard-disk drive  
20 device, a tape storage device, and an optical disk drive.

3. The system of claim 1 wherein said electronic device is implemented as  
an audio-video recorder device that stores said information into said storage  
medium.

4. The system of claim 3 wherein said audio-video recorder device is  
implemented to receive and process any of a digital video signal, a digital  
audio signal, an analog video signal, an analog audio signal, and digital  
stream data.

5. The system of claim 3 wherein said audio-video recorder device is implemented to include a central processing unit, said storage medium, one or more analog-to-digital converters, a plurality of input/output interfaces, and a device memory.

6. The system of claim 5 wherein said device memory includes application software, an operating system, said storage manager, a video encoder, an audio encoder, a video transcoder, an audio transcoder, a multiplexer, a demultiplexer, a storage medium driver, and an interface driver.

7. The system of claim 1 wherein said immediate mode utilizes an audio transcoder to transcode audio input data into a more compact audio format before storing said audio input data into said storage medium, said immediate mode similarly utilizing a video transcoder to transcode video input data into a more compact video format before storing said video input data into said storage medium.

8. The system of claim 1 wherein said storage manager chooses one of a recording parameter alteration technique, a real-time input data transcoding technique, and a previously-stored data transcoding technique to perform said immediate mode of said storage management procedure.

9. The system of claim 1 wherein said storage manager performs said mediate mode of said storage management procedure by scheduling a mediate transcoding system to access and transcode one or more specified stored items from said storage medium as part of a background process in said electronic device, said electronic device responsively turning itself on at an arbitrary time when a system user is unlikely to be utilizing said electronic device, said electronic device then transcoding said one or more specified stored items and turning itself off when finished.

10. The system of claim 1 wherein said mediate mode utilizes a demultiplexer to separate stored information into stored audio data and stored video data, said mediate mode then using an audio transcoder to transcode said stored audio data into a more compact audio format, said  
5 mediate mode similarly utilizing a video transcoder to transcode said stored video data into a more compact video format, said mediate mode then using a multiplexer to recombine said stored audio data and said stored video data into said stored information which may then be rewritten back into said storage medium in a more compact storage space.

11. The system of claim 1 wherein said storage manager determines whether said available storage space in said storage medium is less than at least one predetermined storage-space threshold value that is selectable by a system user.

12. The system of claim 11 wherein a storage medium driver provides current storage capacity information regarding said storage medium to said storage manager for determining whether said available storage space in said storage medium is less than said at least one predetermined storage-space  
20 threshold value.

13. The system of claim 11 wherein said storage manager determines whether a data recording process is currently occurring in said electronic device whenever said available storage space in said storage medium is less  
25 than said at least one predetermined storage-space threshold value.

14. The system of claim 13 wherein said storage manager initiates said mediate mode when said data recording process is not currently occurring in said electronic device, and said available storage space in said storage medium is less than said at least one predetermined storage-space threshold value, said storage manager then scheduling said electronic device to perform said data transcoding procedure on said information from said storage medium.

15. The system of claim 14 wherein a mediate transcoding system coupled to said electronic device performs said transcoding procedure on said specified segments of said information from said storage medium, said storage manager identifying said specified segments for said transcoding procedure in accordance with system-user preference selections that establish a transcoding selection priority that is based upon at least one of a data-type hierarchy system and a data-recording chronology system, said data-type hierarchy system ranking said specified segments according to selected data characteristics, said data-recording chronology system ranking said specified segments from an oldest recording to a newest recording according to respective recording dates and recording times.

16. The system of claim 13 wherein said storage manager determines whether to modify current recording parameters in said immediate mode when said data recording process is currently occurring in said electronic device, and said available storage space in said storage medium is less than said at least one predetermined storage-space threshold value.

17. The system of claim 16 wherein said storage manager initiates said immediate mode in accordance with a system-user selection when said data recording process is currently occurring in said electronic device, and said available storage space in said storage medium is less than said at least one  
5 predetermined storage-space threshold value, said storage manager then referencing a system-user preference to determine whether to operate said immediate mode using a real-time transcoding technique or a parallel transcoding technique.

10 18. The system of claim 17 wherein said storage manager operates said immediate mode using said real-time transcoding technique in which input data that is currently being received by said electronic device is transcoded before being stored into said storage medium.

15 19. The system of claim 17 wherein said storage manager operates said immediate mode using said parallel transcoding technique in which said information that has already been stored into said storage medium is transcoded in a background process, while input data that is currently being received by said electronic device is stored into said storage medium.

20 20. The system of claim 1 wherein any portions of said storage management procedure are implemented by utilizing electronic hardware circuitry that is coupled to said electronic device.

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21. A method for performing a storage management procedure, comprising the steps of:

receiving information from an information source by utilizing an electronic device that responsively stores said information into a storage medium; and

controlling said storage management procedure with a storage manager that selectively activates a data transcoding procedure that transcodes specified segments of said information to thereby increase available storage space in said storage medium, said data transcoding procedure including an immediate mode during which said transcoding procedure occurs while said information is initially being received by said electronic device, said data transcoding procedure further including a mediate mode during which said transcoding procedure occurs when said information is not currently being received by said electronic device.

22. The method of claim 21 wherein said storage medium is implemented to include at least one of a non-volatile storage medium, a hard-disk drive device, a tape storage device, and an optical disk drive.

23. The method of claim 21 wherein said electronic device is implemented as an audio-video recorder device that stores said information into said storage medium.

24. The method of claim 23 wherein said audio-video recorder device is implemented to receive and process any of a digital video signal, a digital audio signal, an analog video signal, an analog audio signal, and digital stream data.

25. The method of claim 23 wherein said audio-video recorder device is implemented to include a central processing unit, said storage medium, one or more analog-to-digital converters, a plurality of input/output interfaces, and a device memory.

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26. The method of claim 25 wherein said device memory includes application software, an operating system, said storage manager, a video encoder, an audio encoder, a video transcoder, an audio transcoder, a multiplexer, a demultiplexer, a storage medium driver, and an interface driver.

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27. The method of claim 21 wherein said immediate mode utilizes an audio transcoder to transcode audio input data into a more compact audio format before storing said audio input data into said storage medium, said immediate mode similarly utilizing a video transcoder to transcode video input data into a more compact video format before storing said video input data into said storage medium.

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28. The method of claim 21 wherein said storage manager chooses one of a recording parameter alteration technique, a real-time input data transcoding technique, and a previously-stored data transcoding technique to perform said immediate mode of said storage management procedure.

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29. The method of claim 21 wherein said storage manager performs said mediate mode of said storage management procedure by scheduling a mediate transcoding system to access and transcode one or more specified stored items from said storage medium as part of a background process in said electronic device, said electronic device responsively turning itself on at an arbitrary time when a system user is unlikely to be utilizing said electronic device, said electronic device then transcoding said one or more specified stored items and turning itself off when finished.

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30. The method of claim 21 wherein said mediate mode utilizes a demultiplexer to separate stored information into stored audio data and stored video data, said mediate mode then using an audio transcoder to transcode said stored audio data into a more compact audio format, said  
5 mediate mode similarly utilizing a video transcoder to transcode said stored video data into a more compact video format, said mediate mode then using a multiplexer to recombine said stored audio data and said stored video data into said stored information which may then be rewritten back into said storage medium in a more compact storage space.

10 31. The method of claim 21 wherein said storage manager determines whether said available storage space in said storage medium is less than at least one predetermined storage-space threshold value that is selectable by a system user.

15 32. The method of claim 31 wherein a storage medium driver provides current storage capacity information regarding said storage medium to said storage manager for determining whether said available storage space in said storage medium is less than said at least one predetermined storage-space  
20 threshold value.

33. The method of claim 31 wherein said storage manager determines whether a data recording process is currently occurring in said electronic device whenever said available storage space in said storage medium is less  
25 than said at least one predetermined storage-space threshold value.



34. The method of claim 33 wherein said storage manager initiates said mediate mode when said data recording process is not currently occurring in said electronic device, and said available storage space in said storage medium is less than said at least one predetermined storage-space threshold value, said storage manager then scheduling said electronic device to perform said data transcoding procedure on said information from said storage medium.

35. The method of claim 34 wherein a mediate transcoding system coupled to said electronic device performs said transcoding procedure on said specified segments of said information from said storage medium, said storage manager identifying said specified segments for said transcoding procedure in accordance with system-user preference selections that establish a transcoding selection priority that is based upon at least one of a data-type hierarchy system and a data-recording chronology system, said data-type hierarchy system ranking said specified segments according to selected data characteristics, said data-recording chronology system ranking said specified segments from an oldest recording to a newest recording according to respective recording dates and recording times.

36. The method of claim 33 wherein said storage manager determines whether to modify current recording parameters in said immediate mode when said data recording process is currently occurring in said electronic device, and said available storage space in said storage medium is less than said at least one predetermined storage-space threshold value.

37. The method of claim 36 wherein said storage manager initiates said immediate mode in accordance with a system-user selection when said data recording process is currently occurring in said electronic device, and said available storage space in said storage medium is less than said at least one predetermined storage-space threshold value, said storage manager then referencing a system-user preference to determine whether to operate said immediate mode using a real-time transcoding technique or a parallel transcoding technique.

38. The method of claim 37 wherein said storage manager operates said immediate mode using said real-time transcoding technique in which input data that is currently being received by said electronic device is transcoded before being stored into said storage medium.

39. The method of claim 37 wherein said storage manager operates said immediate mode using said parallel transcoding technique in which said information that has already been stored into said storage medium is transcoded in a background process, while input data that is currently being received by said electronic device is stored into said storage medium.

40. The method of claim 21 wherein any portions of said storage management procedure are implemented by utilizing electronic hardware circuitry that is coupled to said electronic device.

41. A computer-readable medium comprising program instructions for performing a storage management procedure by performing the steps of:  
receiving information from an information source by utilizing an  
electronic device that responsively stores said information into a  
storage medium; and  
controlling said storage management procedure with a storage manager  
that selectively activates a data transcoding procedure that  
transcodes specified segments of said information to thereby  
increase available storage space in said storage medium, said  
data transcoding procedure including an immediate mode during  
which said transcoding procedure occurs while said information  
is initially being received by said electronic device, said data  
transcoding procedure further including a mediate mode during  
which said transcoding procedure occurs when said information  
is not currently being received by said electronic device.

42. A system for performing a storage management procedure, comprising:  
means for receiving information from an information source and  
responsively storing said information into a storage medium; and  
means for controlling said storage management procedure by activating  
a data transcoding procedure that transcodes specified segments  
of said information to thereby increase available storage space in  
said storage medium, said data transcoding procedure including  
an immediate mode during which said transcoding procedure  
occurs while said information is initially being received by said  
electronic device, said data transcoding procedure further  
including a mediate mode during which said transcoding  
procedure occurs when said information is not currently being  
received by said electronic device.

43. A system for performing a storage management procedure, comprising:  
an electronic device configured to receive information from an  
information source, said electronic device responsively storing  
said information into a storage medium; and  
5 a storage manager configured to control said storage management  
procedure by selectively activating a data transcoding procedure  
that transcodes specified segments of said information to thereby  
increase available storage space in said storage medium.

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